REMARKS/ARGUMENTS

Reconsideration of this patent application is respectfully requested in view of the foregoing amendments and the following remarks.

The Examiner has objected to the Abstract. A Replacement Abstract is enclosed.

The Examiner has objected to the specification for a number of informalities. The specification has been amended to overcome these objections.

The examiner has objected to claims 13, 17, and 24 for a number of informalities. These claims have been amended to overcome these objections.

The Examiner has rejected claims 13-30 as being unpatentable over U.S. Patent No. 6,057,523 to *Fujii et al.* in view of U.S. Patent No. 3,940,624 to *Simmons*, and in further view of *Mueller et al.*

The rejections are respectfully traversed.

It is respectfully submitted that neither *Fujii et al.* or *Simmons* discloses a method for monitoring the quality of spot welding using a strip of foil between electrodes and workpieces. The Examiner has acknowledged this result in the most recent office action. However, the Examiner has stated that *Fujii et al.* and *Simmons* can be modified by *Mueller et al.* in order to apply this step of using a strip of foil.

Neither *Fujii et al.*, *Simmons* or *Mueller et al.* disclose the steps as recited in independent claim 13 and the combination of these three references does not result in a process relating to these steps as well.

To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

It is respectfully submitted that the reference to *Fujii et al.* discloses the method of controlling welding conditions of a resistance welder. *Fujii et al.* does not disclose the use of the strip or foil in combination with the detection means to monitor spot welds. The patent to *Fujii et al.* is directed towards a complicated computerized monitoring of the welding process by determining a plurality of different characteristics associated with the welding process. According to column 4 of *Fujii et al.* and FIG. 2, this process monitors the welding current, the welding voltage, the resulting welding impedance change, and the magnetic permeability change, before determining a number of other additional factors such as calculating a current density, the temperature distribution or other factors. All of this occurs before or during the welding process in *Fujii et al.*

As stated above *Fujii et al.* does not mention the use of an additional strip or foil. There is also no suggestion to use an additional strip or foil which would relate to optical evaluation of a welding spot or spot weld rather than based upon the evidence gathered in *Fujii et al.* above. Accordingly, there is no mention in *Fujii et al.* of any optical evaluation of the spot weld or related foils to determine the quality of the spot weld.

In fact, *Fujii et al.* does not disclose the following steps recited in claim 13:

> ***inserting a strip between at least two electrodes and metal sheets;...***
>
> ***conveying said strip past said at least two electrodes and said metal sheets after said step of welding metal sheets together, and wherein said strip is configured so that it forms an image representing the spot weld;...***
>
> ***detecting and evaluating said image formed on said strip;...***
>
> ***assessing said spot weld on said metal sheets via optical visualization of said image on said strip; and***
>
> ***determining the size, shape and position of the spot weld on said metal sheets from said image on said strip.***

Simmons includes an optical detector (60) and a mylar film 46 which is used to determine a quality of a weld spot based upon a heat generated from a source radiated on the already formed weld spot. This image formed on the mylar film is formed after the weld spot has been created. The procedure according to *Simmons* uses a MYLARR film that is drawn over the welding site with a liquid crystal. There is a resulting change in the liquid crystal that is brought about by the heat related from the welding site that is optically detected. With this procedure, the component itself or the liquid crystal display, which is not stable, is evaluated, thus necessitating site related and time related measurements.

Thus, because *Simmons* uses a mylar film, it would be impractical to insert this mylar film between the electrodes and the metal sheets to be welded. Thus, *Simmons* does not disclose at least the following steps recited in claim 13:

> ***inserting a strip between at least two electrodes and metal sheets;***
>
> ***conveying said strip past said at least two electrodes and said metal sheets after said step of welding metal sheets together, and***

wherein said strip is configured so that it forms an image representing the spot weld;..

determining the size, shape and position of the spot weld on said metal sheets from said image on said strip.

Mueller et al. discloses using a strip during the welding process to protect the electrodes. There is no mention in *Muller et al.* of using these strips or any strips for the evaluation of a weld. With the process of *Mueller*, reference monitoring of the quality of the weld spot must be done on the workpiece itself. This process can be very time consuming and difficult, especially in the case of car body parts which is the example provided by *Mueller et al.*

With the present invention as recited claim 13, the welding spot on the workpiece for the metal sheet itself, is not evaluated, but rather a new image reproduction of the welding spot. This process allows the evaluation to be performed in a locally unrestricted manner.

In the case of relatively large work pieces, the method according to *Simmons*, requires a manipulation of the workpiece. In contrast, with the method according to the present invention,

the strip of foil can be easily transferred to an evaluation unit and thus the quality of each welding spot can then be determined separate from the welded piece regardless of the size of the work piece.

It is respectfully submitted that the references to *Fujii et al.*, *Simmons* and *Mueller et al.* alone, do not suggest the method recited in claim 13. In addition, it is respectfully submitted that there is no suggestion to combine these references together to arrive at the present invention as recited in claim 13.

For example, it is respectfully submitted that there is no suggestion or motivation to combine *Fujii et al.* with *Simmons* or *Mueller et al.* *Fujii et al.* does not even disclose using a film for determination of the weld. In addition, *Fujii et al.* does not disclose any optical evaluation of the weld spot. With *Simmons*, a film is disclosed but this film is only used after the welding process takes place. This film is a mylar film and thus, would likely be destroyed if placed between the electrodes of a welding apparatus. With *Mueller et al.*, a film is disclosed between the electrodes, however this film is not used for any evaluation purposes.

To establish a prima facie case of obviousness, A) The claimed invention must be considered as a whole; B) The references must be considered as a whole and must suggest the desirability and thus the obviousness of making the combination; C) The references must be viewed without the benefit of impermissible hindsight vision afforded by the claimed invention and D) Reasonable expectation of success is the standard with which obviousness is determined. *Hodosh v. Block Drug Co., Inc.*, 786 F.2d 1136, 1143 n.5, 229 USPQ 182, 187 n.5 (Fed. Cir. 1986).

It is respectfully submitted that when considering the invention as recited in claim 13 as a whole, the invention is not obvious in view of these references. For example, there is no suggestion for introducing a strip into the process of *Fujii et al*. The introduction of a strip would be totally unrelated to the process for continuously analyzing the welding spot via the characteristics of current, voltage, impedance, and magnetic permeability to determine the quality of the weld spot. However, the specification of the present application, on page 11 outlines the problems of only analyzing the characteristics associated with the process similar to *Fujii et al.*:

Yet, the contact surface may become too large, and hence the current density too small, on account of deformed and, in particular, worn electrodes 6. It may, moreover, happen that current flows past the desired welding spot 13 without contributing to material smelting due to preceding welding spots 13 or deformations of the metal sheets 3, 4. The resistances of the welding power circuit and, in particular, the preponderant contact resistances are subject to unpredictable and uncontrollable fluctuations caused, for instance, also by contaminated metal sheets 3, 4 or contaminated electrodes 6. Furthermore, poor welding spots 13 may be caused by an imperfect positioning of the welding tong 2 or metal sheets 3, 4, or by deformations of the metal sheets 3, 4, which prevent the electrodes 6 from contacting the metal sheets 3, 4, or the metal sheets 3, 4 from contacting each other, as required. The above-mentioned reasons urgently call for the monitoring of the quality of welding spots and, in particular, the inspection of the welding spot 13 after a welding process.

Thus, the method recited in the pending claims does not rely on *Fujii et al.* for any teaching, but instead is designed to overcome the shortcomings of *Fujii et al.* by introducing a strip between the electrodes to be optically evaluated.

In addition, *Simmons*, includes no suggestion for inserting a strip between electrodes during a welding process because with this process, the Mylar strip would likely melt between the electrodes during the welding process. Furthermore, the process according to *Simmons*, can be costly and time consuming in an automated welding process, because to evaluate a weld spot in

Simmons, the weld spot must be re-heated after the welding and then passed adjacent to an optical imager which reviews the image formed on the mylar sheet. This step is completely avoided by the process according to claim 13.

Finally, as disclosed above *Mueller et al.* discloses using strips between electrodes only for the purpose of protecting the electrodes and not for the purpose of evaluation of the spot weld. Therefore, these references actually teach away from their combination because they all act independently from each other with different purposes and do not suggest in any way their combination. Even if these references were combined together, there would not be any reasonable expectation of success.

For example, the evaluation steps outlined in *Fujii et al.* are totally unrelated to the optical evaluation of the strip that is necessary in the present invention. The evaluation of *Simmons* can only occur after the welding process and does not even include strips disposed between the electrodes. There is no suggestion on how to optically evaluate strips that were disposed between the electrodes during the welding process and which were affected by the welding process. This distinction is important

because the positioning of these strips between the electrodes during the welding process can provide a much more accurate indication of the quality of the weld provided than by simply heating a weld after the welding process has taken place and then reviewing the quality of the weld with a mylar strip.

With this process as disclosed in *Simmons*, the optical system determines a refractive index of a material responding to a temperature developed in a weld spot by an applied heat beam incident to one side of the weld, and the developed temperature measured in the other side of the weld as a function of the quality of the weld. None of these characteristics are even considered with the process according to the present invention as recited in claim 13. Instead, the method recited in claim 13 only optically determines the effect that the electrodes have on the strip during the welding process.

Mueller et al. is completely silent as to any evaluation so it is respectfully submitted that any combination of the above two references with relation to steps associated with evaluation of a weld spot would not lead to any greater likelihood of success.

It is respectfully submitted that these references can only be combined by the use of "impermissible hindsight", which is expressly not allowed by the Federal Circuit. This is because the only commonality between these references is that one or more features disclosed in these references is also recited in claim 13.

Therefore, it is respectfully submitted that claim 13 as amended is patentable over the above cited references taken either singly on in combination.

It is respectfully submitted that claims 14-31 which depend from claim 13 are patentable as well.

New claim 31 has been added. Support for this claim can be found in the original claims as filed and in the specification on page 13, lines 14 and 15. It is also submitted that this step or feature is also not mentioned or even contemplated by any one of the above three references.

Therefore, it is respectfully submitted that claim 31 is patentable over the above cited references taken either singly or in combination.

Applicant respectfully request that a timely Notice of Allowance be issued in this case.

Respectfully submitted,
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Enclosure(s): Replacement Abstract
Petition under Rules 136(a) and 17(a)(2) for two (2) month extension of time.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop: Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on March 20, 2007.

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